# ON THE ROENTGENOLOGIC DIAGNOSIS OF GASTRIC DIVERTICULA

Assoc. prof. D. Popmikhailov

Diverticula of the stomach are most seldom encountered among diverticula of the gastrointestinal tract. Their identification is more difficult as compared with the diverticula of other sections of the gastrointestinal tract. This is due to the fact that they are not easily filled up with barium contrast medium because food and secretions may be retained in them.

According to various statistics their incidence varies between 0,03% and 0,10%. Authors from Mayo Clinic (Andrews, Stevens, and Kirklin) report that out of 3662 necropsies diverticula of the stomach were found in 4 (0,10%).

According to Winter up to 1951 a total of 291 cases with diverticula of the stomach were reported in literature. In 1953 Sommer and Goodrich report that this number already amounts to 449. This is explained with the improvement of the examination technique and the greater diagnostic vigilance. In the Soviet literature till 1954 a total of 40 observations on diverticula of the stomach have been published (after Melnikov, A. V.).

In the last ten years we have had the opportunity to diagnose diverticula of the stomach in 22 patients and to follow some of them who represent clinical and roentgenological interest.

Gastric diverticula are local dilatations of the stomach with a circular or oval form, connected with the stomach by means of a short or a longer pedicle. The size of diverticula varies from the size of beans to strawberry, sometimes being even larger. With regard to whether their wall contains all the layers of the stomach or only mucous membrane, there are two types of diverticula: false and true. The false ones are inconstant and some authors regard them as being due to a protrusion of the gastric mucosa through a tear in the muscular coat. Usually the diverticula are localized in the cardial part of the fornix — towards its dorsal wall in the vicinity of the small curvature and rarely in the prepyloric area or the large curvature. This usual localization is ascribed by some authors to anatomical particularities of the muscles in the cardial area where the longitudinal muscle fibres are dissociated into two bundles directed towards the small and large curvatures. For that reason in this part of the stomach there are only circular muscle fibres through which a protrusion of the mucosa may easily occur together with the submucosa through a thin layer of muscularis propria. Therefore the protrusion of the gastric wall is considered a result of constitutional weakness. Besides this congenital weakness of the mus-

cles of the gastric wall neuromotoric disorders may play part in the pathogenesis of diverticula of the stomach as a result of adjacent and remote reflectory stimuli (Hartmann, Bergmann etc). According to Barsony these stimuli lead to reflectory relaxation and to a greater readiness for protrusion of the mucosa through the weakened muscular layer of the gastric wall.

Lately in the literature the existance is also pointed out of the so called functionally inconstant diverticula of the stomach. According to Savitzkii, A. I. they are due to functional relaxation of the gastric wall at a definite area of the atrophic muscular fibres. Barsony ascribes them to "regional muscular depression".

Grabovski describes a case in which roentgenologically a diverticulum-like dilatation of the small curvature was observed, with the size of a nut. This finding was not confirmed on operation. If the stomach is clipped during the operation in the area of the roentgenologically established dilatation a protrusion of the gastric wall appears in the form of a diverticulum. This phenomenon lasted for about 1 minute. A. I. Savitzkii reports two cases in the cardial portion of the stomach, which were not confirmed on operation, but on control X-ray examinations performed after the operation were once again roentgenologically detected. A similar case with negative surgical findings is also reported by Weiss.

Fig. 1

We observed an analogous case with an appical diverticulum of the stomach, which at the operation performed for a duodenal ulcer could not be observed although it was clearly seen on the roentgenograms, made both before and after the operation (See observation 2, Fig. 7 and 8, 9, 10).

**Roentgenologic symptomatology.** Detection of gastric diverticula relies mainly upon roentgenologic examination. They are observed as circular or oval additional shadows with smooth and well defined borders, lying upon a pedicle, which connects them with the stomach (Fig. 1). Usually they are larger than the niche of a gastric ulcer. Examination in the upright position of the patient reveals that in most cases the diverticula acquire the form of a "pending bag" in which a trilayer shadow may be observed, as in a large callous ulcer or a penetrating ulcer of the stomach. In recumbent position of the patient these shades become more oval and larger because they have flexible walls. The changes in the form and the size may be observed also on serial roentgeno-

grams (Fig. 2) performed at intervals of several minutes. This proves the flexibility and the presence fo peristalsis, which is not observed in the niche of a gastric ulcer. Sometimes the diverticula of the stomach are filled up with the first gulps of the barium contrast medium. Their filling is usually possible in a recumbent position of the patient. This refers particularly to diverticula localized high in the cardial portion of the stomach.

Fig. 2

In case the isthmus of the diverticulum is thin with a swollen, inflammed mucous membrane, owing to retained food or in general when the diverticulum contains waste material or secretions it may not be filled with contrast medium. In such cases examination of the patient in recumbent position is required — on the back, on the abdomen and sometimes in Trendelenburg's position. Diverticula localized high in the cardial part of the stomach are filled up comparatively more difficult than those localized elsewhere in the stomach. According to Wieser in the upright position only about ¼ of the diverticula are filled with contrast medium when they are localized in the cardial part of the stomach. Their high position and the difficult penetration of the barium contrast medium are the reasons for this, on the one hand and the inaccessibility for convinient palpation behind the costal margin — on the other.

When an additional shade is observed over the contours of the stomach, suspective of being a diverticulum in order to prove that it is actually a diverticulum we must bear in mind some characteristic signs of the diverticula which if not known may lead to flagrant diagnostic errors. An important diagnostic sign of diverticula is the presence of mucosal relief, which may be traced to the isthmus and as well as in the diverticulum itself, more easily accessible with compression under a thin layer of contrast medium. Examination from the upright to recumbent position reveals changes in the form and size of the diverticula due to the flexibility of their walls. Another peculiarity which differentiates them from the niche of the gastric ulcer is the lack of "inflammatory bank" in the area of their fixation to the gastric wall, a sign which is not observed in gastric ulcer. Their form and size changes depending on the degree of their filling with barium contrast medium which is clearly observed in serial roentgenograms. Peristalsis of the diverticulum's wall which cannot be detected by roentgenologic examination also contributes for this observation.

The X-ray image of the so called appical diverticulla of the stomach (after Barsony and Kopenstein) is even more obscure. In the upright position they appear as "pending bags" sticking to the contours of the small curvature in the area of the fornix. In this case a diverticulum may be taken for a niche of a gastric ulcer but with examination in a recumbent position it acquires the form of a strawberry or a mushroom, lying over a shorter or a longer pedicle, which appears as a continuation of the contours of the medial part of the gastric fornix. Sometimes diagnostic pitfalls occur in differentiation of a small diverticulum with a short pedicle from an ulcer niche or a diverticulum which resembles a big penetrating or calous ulcer (See observation 1 and 4, Fig. 4 and 14). In these cases namely it is possible to make use of the sign described by us of splitting the shade of the diverticulum in polygraphic examination. Polygraphy should be performed in complete apnea, preliminary exercise with the patient for a more continuous retaining of breathing being made. It is sufficient to make a biplogram with intervals between the exponations of 6—7, even 8 secunds depending upon the tonus of the stomach. In a decreased tonus polygraphy may be performed also after pharmacodynamic examination (with morphine, proserine or nivalline). When the muscular fibres are preserved in the wall of the diverticulum, a double shade of the diverticulum is observed — on biplogram. In some cases the contours of the diverticulum remain double also on the triprogram — this is a sign of hypoperistalsis. When the muscular fibres are completely reduced such a splitting does not occur and then differentiation between a diverticulum and a niche is rendered impossible if no other roentgenological signs exist, as previously mentioned. In the handbooks on roentgenology and in the accessible literature we could not find descriptions of cases with application of polygraphy in the differentiation of diverticula from ulcer niches.

Sometimes the contours of the diverticulum in the cardial region may be seen on roentgenograms without thense of contrast medium (See observation 2, Fig. 8) particularly when thickening of its walls occurs in diverticulitis. The presence of air in the diverticulum as well as the normally existing air in the fornix increase the liability for visualization of the thickened walls. In these cases the edges of the diverticulum are seen as a ring-like shade corresponding to its form and size. This we call the "symptom of the ring", which we regard as an indirect feature of diverticulitis. When such a ring-like shade suspective of diverticulum is seen a thorough examination with barium contrast medium is needed for its elucidation.

Different views exist on the clinical symptoms of gastric diverticula, particularly on the socalled "appical diverticula", which are considered by some authors (Beck, Barsony, Koppenstein, Kalbfleisch, etc. as "asymptomatic". It is justified that many authors lay stress on the fact that the complaints of the patients do not depend on the whole upon the size and location of the diverticulum, but rather on the degree of the existing inflammatory changes — diverticulitis and peridiverticulitis, resp. Many authors point out that gastric diverticula may be manifested under the picture of various gastrointestinal, biliary and other abdo-

minal disorders, thus presenting serious diagnostic pitfalls (Sherer, Kindler, Weiss, Sagatelian, etc.).

Usually the patients complain of discomfort or pains in the epigastric area, burning, regurgitation, nausea or vomiting. Scherer, Kindler, etc. point out that a "feeling of satiety" is a comparatively common symptom in diverticula occuring even after the first bites of food. These complaints were observed also in one of our patients. According to Brückner, Davidson etc. case histories typical of gastric ulcer may be observed in gastric diverticula. Among 14 personal observations with appical localization of the diverticula (out of a total of 22 cases) 4 presented case histories typical of gastric ulcer, 3 — of cholecystic disorder and the remaining had undermined dyspeptic complaints. The patients with history of gastric ulcer (three females and one male) appeared periodically for control examinations in the course of 5—6 years, but even in the most detailed controls no one presented roentgenologic evidence of gastric or duodenal ulcer. Nevertheless, their complaints continue even up to the present, with alternate decrease or even complete subsidence and periodic increase at different intervals of time. One of our patients had a duodenal ulcer detected 5 years before. A gastric resection was performed, but the pains remained unaffected by the operation (See details in observation 2).

The combination between diverticulum and a gastric or duodenal ulcer is not a rare finding. A niche may be observed even in the diverticulum itself (Schinz, Weiss). There are isolated reports in the literature on the occurrence of carcinoma in a gastric diverticulum (Brown et al., H. V. Horoshko, A. V. Melnikov, etc.).

Diverticula of the stomach are usually associated with intestinal diverticula: they are more common in females. In our group 13 patients are females and 9 males. In two of them we established simultaneous diverticula of the stomach and the intestines. We shall discuss only 5 of our 22 patients with gastric diverticulla of varying localization. They have also been subjected to polygraphic studies.

In all our patients diverticula have been detected in examinations undertaken on the occasion of diverse gastrointestinal and other abdominal complaints. According to localization they may be classified as follows: in the fornix region — medial (i.e. appical diverticula) — 14 patients; in the immediate vicinity of the cardia (subcardial region) — 3; on the small curvature of the stomach (its medial third) — 2; on the big curvature (the upper third and prepyloric of the big curvature) — 2; and on the pyloric canal itself — 1 case.

Observation 1: D.S.D., aged 56, ambul. No. 1182 — June 1, 1953. Case history: since 10 years discomfort and occasionally tenderness in the upper half of the abdomen, increasing after meals. He often had regurgitations, nausea and a burning sensation behind the sternum. At X-ray examination suspicion arose for carcinoma of the stomach, but this diagnosis was rejected by another roentgenologist.

From the laboratory examinations: gastric juice — total acidity — 30, free hydrochloric acid — 20.

Our X-ray examination of the stomach and the duodenum (June 1, 1953) showed: oesophagus and cardia — no pathological findings; a slightly hypertonic stomach with smooth and well defined contours. The relief of the mucosa in the digestive portion of the stomach is sharply delineated. The prepyloric part is cone-shaped and narrowed (Fig. 3), but the mucosal folds are continuous. When a larger amount of contrast

medium is ingested, an additional shadow as big as a corn grain with slightly sharpened low medial edge and a horizontal level in it is distinguished in the upper and medial portion of the fornix, adjacent to the contours of the small curvature (Fig. 4). Its contours are smooth and well defined. It is in connection with the stomach by means of a tender, thin isthmus, visible only on examination in a recumbent position, the shade acquiring a triangular form and the size being doubled (Fig. 5). Following a pharmacological examination combined with polygraphy peristalsis is detected in the cone-shaped narrow prepyloric portion as well as double contours of the described additional shade (Fig. 6 — polygram). Pyloric passage is normal. Bulbus duodeni — no pathologic changes. The small intestines and the colon display no abnormalities. After 24 hours post cibum-after meals an almost complete retaining of the barium contrast medium is established in the described additional shade of the stomach.

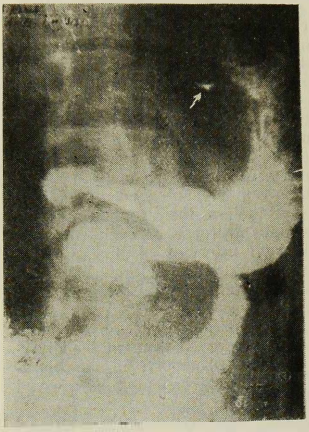

Fig. 3

Conclusion. Appical diverticulum of the stomach with a continuous retaining of the contrast medium in it; a marked symptom of double contours of the diverticulum's shade (on polygram). Partial gastrospasm — prepyloric, perhaps reflectory, conditioned by the presence of diverticulitis.

This is our first patient in whom we observed a splitting of the diverticulum's shade in polygraphic examination. The presence of gastrospasm gave grounds to another roentgenologist to suspect a scirrhous carcinoma. The pharmacodynamic examination of the stomach performed by us and followed by a polygram revealed normal peristalsis in a cone-shaped narrow prepyloric portion of the stomach, as well as splitting of the contours of the diverticulum which in the upright position simulated to a large extent a penetrating ulcer. This splitting of its shade is an argument sufficient to reject the supposition that not an ulcer niche but a diverticulum is concerned. This is supported also by the change in the form and the size of the diverticulum when examination is performed by changing the position of the patient from upright to recumbent (see Fig. 3, 4 and Fig. 5).

At periodic X-ray checks of this patient for more than 5 years — we had the impression that at periods of longer retaining of the barium contrast medium in the diverticulum, there has been an evidence of more markedly manifested gastrospasm — apparently reflexively conditioned by the existing inflammatory changes of the diverticulum. This coincides with more intensive complaints on the part of the patient.

Observation 2. M.K.D., a physician aged 34, case history No. 4886/494 from April 29, 1954. Surgical Clinic No. 1.

History: since 5 years inconstant pains and discomfort in the right half of the abdomen. Appendicitis was diagnosed and she was operated on, but the tenderness continued. She often had a burning sensation in the oesophagus, nausea, sometimes vomiting after which she felt relieved. A feeling of satiety occurred even after the first mouthful of food. After meals the pains increased and continued for about one-two hours. In 1952 an ulcer was detected in the cardial region of the stomach with the size of a hazelnut. When the X-ray examination was repeated the patient was told by another roentgenologist that a gastric diverticulum is concerned. The pains gradually increased and sometimes with a colic-like character: usually accompanied by vomiting. A diagnosis of subileus was made and the patient was subjected to laparotomy, but only slight adhaesions in the ileocoecal region were found. In 1953 melena occurred. A duodenal ulcer was detected by X-ray examination. For that reason she was admitted to hospital for operation.

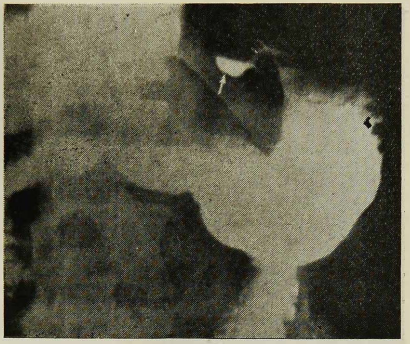

Fig. 4

Paraclinic data: blood picture — without any deviations from the normal; gastric juice — total acidity — 50; free hydrochloric acid — 35. In X-ray examination of the stomach and duodenum (amb. No. 3900, April 30, 1954) the following was established: in the upper medial part of the gastric fornix an oval shaped additional shade is detected. The latter is connected with the stomach by means of an isthmus visible only on examination in recumbent position. In the horizontal position the shade acquires bigger dimensions. Peristalsis is increased, effective. Bulbus duodeni is slightly deformed, painful on compression. Centrally a small constant shade — a niche is also seen. On polygram the abovementioned shade is seen in double contours (Fig. 7).

Conclusion. Appical diverticulum of the stomach; on polygram a „symptom of double contour shade of the diverticulum" is observed. Evidence of ulcus duodeni.

X-ray controls performed after resection of the stomach reveal the following (Amb. No. 14396 — December 14, 1954): highly resected stomach, with a normally functioning gastroenterostomosis. At the site of the previously observed diverticulum a slight ring-form shade is seen even without barium contrast medium. This shade simulates a cavity with slightly thickened walls and a fluid level in it (Fig. 8). In the upright position it does not fill with contrast medium but on examination in a recumbent position an additional shade appears in this region — a diverticulum with the same form and size as on examination prior to operation. Control polygram reveals a splitting of the additional shade mainly in its lower half (Fig. 9) while ordinary roentgenography does not detect this splitting (Fig. 10). Twenty four hours later the diverticulum is almost filled with barium contrast medium. The colon is normal.

Conclusion. Status post resection of the stomach with a regularly functioning gastroenterostomosis. Appical diverticulum of the stomach with a marked "symptom of the ring". The continuous retaining of the contrast medium in the diverticulum is an indirect symptom of diverticulitis.

This patient was continuously treated for various gastrointestinal disorders. Despite the successively performed operations for appendicitis, probatory laparotomia for "subileus", resection of the stomach for duo-

denal ulcer, her complaints continued without any considerable change after the operations were performed. During surgical treatment for the ulcer, the diverticulum remained unrevealed. It was detected roentgeno-

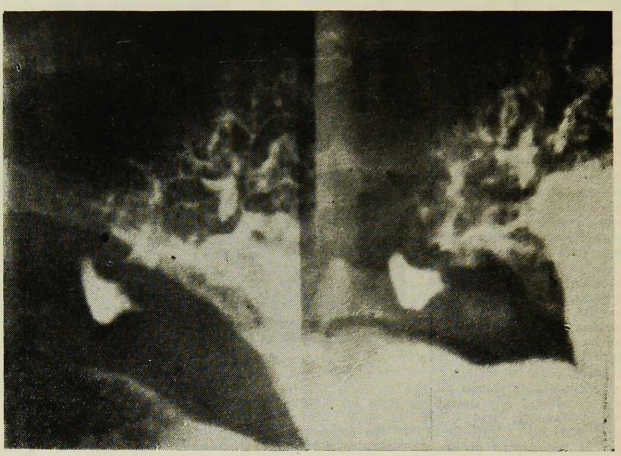

Fig. 5

logically also after the operation. It appears most characteristic, that the diverticulum is visible on an ordinary roentgenogram (without the use of barium contrast medium), which is accepted by us as an indirect symptom of diverticulitis. The latter is the reason for the persisting gastric complaints eventhough an operation for duodenal ulcer was performed. No changes of the billiary tract were detected on cholecystography.

This case clearly shows that appical diverticula do not follow an asymptomatic course as some authors assert. Diverticula may display the clinical picture of various abdominal disorders.

Observation 3. Male, aged 55, amb. No. 28392 from December 30, 1955.

History: for many years complains of abdominal discomfort continuous regurgitations and foulfaste in the mouth. Sometimes nausea at fatty meals. No pain so far.

Paraclinical findings: X-ray examination of the stomach and the duodenum (December 30th, 1955) reveals: after the first gulps of the barium contrast medium, in the upper third of the dorsal wall of the stomach an additional shade is seen with the size of a large corn grain (Fig. 11); its contours are smooth and well delined in recumbent position this shade changes its form — it acquires a more flattened appical portion and an elongated isthmus (Fig. 12). No inflammatory changes are observed in its base; convergence of the mucosal folds toward the additional shade

is also lacking. On polygram marked peristaltic waves in the egestion part of the stomach are observed, as well as double contours of the described additional shade (Fig. 13), which resembles a ring around it. The pylorus is normally passable. Bulbus duodeni displays no pathological changes. After 4 hours the stomach is empty. Only little contrast medium is retained at the bottom of the additional shade.

Conclusion. Diverticulum of the stomach — in the upper third its dorsal wall with a marked symptom of splitting of its shade (on polygram).

In this patient the diverticulum has an X-ray image of a calous ulcer; convergence of the folds toward the additional shade is lacking, also an "inflammatory ring" which is usually observed in ulcer niche of the same size. On polygram the symptom of splitting of the additional shade is observed, characteristic of diverticula. The change in form and size of the described findings, when examination is performed in the upright position and the changed to recumbent position supports the diagnosis of gastric diverticulum (compare Fig. 11 and Fig. 12).

Observation 4. E.V.S., female aged 70, amb. No. 24 423, July 14th, 1953.

History: for many years complains of tenderness in the stomach, irrelevant to the type of food injested. She has had a bad appetite. Acid regurgitations occur after meals. She has been treated for gastritis and gall bladder disorders.

Paraclinical findings: Blood picture: Hb. — 70%, Er — 4 050 000; leucocytes — 5 600; ESR — 10 mm after Panchenko, Weltmann — 7/9 test tubes; MacLagan — 40 U. X-ray examination of the stomach and duodenum (December 14. 1953) indicates: hypotonic stomach with a slightly coarse relief. Toward the middle portion of the small curvature of big oval additional shade is seen, having dimensions of 4:2 cm with smooth and sharp contours. The longitudinal axis of the shade is almost parallel to the small curvature. It is connected with the cavity of the stomach by means of a long „pedicle", whose contours are also smooth and sharp, diverging gradually toward the cavity of the stomach and delineating with the described shade a figure which reminds of a mushroom. The mucosal relief in the upper half of the stomach is somewhat coarse. Slight tenderness occurs at palpation in the area of the oval shade. The mobility of the stomach is preserved. In recumbent position the additional shade acquires a more oval form. Peristalsis is present at both gastric curvatures. Efficient pyloric passage. Bulbus duodeni — no pathologic changes. In the area of flexura duodenojejunalis another similar oval shade is seen, with smooth and sharp contours — a diverticulum with the size of a chestnut.

On the polygram clearly double contours are seen along the entire length of the additional shade, as a ring around it (Fig. 14). After 24 hours post cibum = after meals, the barium contrast medium fills uniformly all the segments of the colon which displays no changes. In the observed additional shade toward the small curvature of the stomach an almost complete retaining of the barium contrast medium is seen.

Conclusion: large diverticulum of the small curvature of the stomach with the symptom of double contours of its shade — on polygram; diverticulum also in the area of flexura duodenojejunalis.

In this patient owing to the big size of the additional shade (4×2 cm) the roentgenologist may assume at first glance that a big penetrating ulcer is present. The presence of an obvious splitting of the additional shade in polygraphic examination witnesses a preserved flexibility of the diverticulum's wall; this sign would not be observed if a penetrating ulcer was concerned. The preserved mobility of the stomach in this area, in the presence of such a large additional shade as well as the comparatively insignificant complaints of the patient reject the diagnosis of ulcer.

Control examination after 2 years reveals the same insignificant complaints as before. The roentgenological findings of the stomach were **the same.**

Fig. 7

Fig. 6

Fig. 10



Fig. 9



Fig. 8

Fig. 12

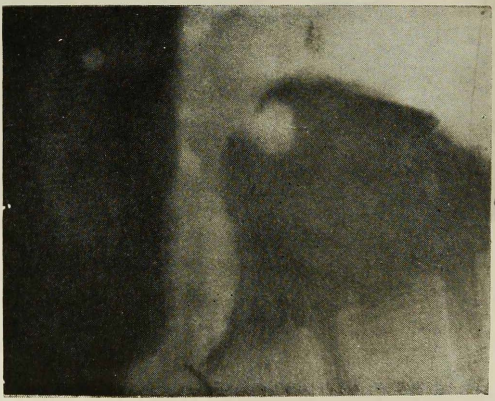

Fig. 11

Fig. 15



Fig. 14



Fig. 13

Observation 5. M.H.P., a female aged 46, amb. No. 10 708. May 29th, 1959.

History: from about 3—4 years the patient had each spring and autumn severe abdominal pains, mainly on the right side, occurring 1—2 hours after meals; the pains continued for about an hour and gradually subsided. Often she vomited, being relieved afterwards. Suspicion was voiced for gastric ulcer and she was treated as an outpatient for this disorder.

Paraclinical findings: blood picture — normal. Gastric juice: total acidity — 38; free hydrochloric acid — 26. X-ray examination of the stomach and the duodenum revealed (May 29th, 1959) the following: normotonic stomach with smooth and sharp contours. Peristalsis is slightly accelerated, passing without any interruptions along both curvatures of the stomach. On the large curvature — prepyloric and adjacent to the pylorus an oval additional shade having the size of a cherry, is seen; it has a short pedicle, in which mucosal folds passing into the shade are clearly detected. At the beginning of the examination the pylorus displays a short spasm and later the contrast medium passes at intervals. No pathologic changes of the bulbus duodeni are recorded. A splitting of this shade in its external half is observed on biplogram (Fig. 16).

Fig. 16

After 6 hours the stomach is empty. At the bottom of the additional shade retaining of the contrast medium is seen, which is present 24 hours post cibum after its injestion.

Conclusion: a diverticulum of the large curvature of the stomach at its prepyloric area with a marked symptom of splitting of the shade (on polygraphy). Continuous retaining of the contrast medium in the diverticulum — an indirect symptom for diverticulitis.

The presence of an ulcer history is characteristic of this patient. Upon repeated control examinations at 3 and 6 months intervals (by means of serial roentgenograms) no symptoms of gastric or duodenal ulcer were discovered. Cholangiocystographic examination also showed no pathologic changes of the biliary tract. The frequent vomiting may have been of reflectory origin secondary to the existing diverticulitis with a subsequent pylorospasm owing to the continuous retaining of food in the diverticulum, analogous to the established contrast medium retaining.

## Conclusions

1. The X-ray examination plays a decisive role in lifetime detection of the diverticulum of the stomach.

Gastric diverticula are not a very rare finding, as is assumed by some authors. Their detection requires a thorough X-ray examination in different positions of the patient.

2. An important diagnostic sign for diverticula is the detection of a relief in their isthmus and in the diverticulum itself, as well as the changes in the form and size of the diverticulum upon examining the patient in the upright and recumbent position or on serial roentgenograms of several minutes intervals.

3. In cases difficult for differentiation between gastric diverticulum and ulcerous niche the symptom of splitting the shade of the diverticulum described by us on polygraphic examination is of valuable aid.

4. Owing to common filling of the diverticula with food and secretions in most cases their detection is possible only if an examination of the patient is performed also in recumbent position, particularly important for diverticula located in the cardial region of the stomach which are actually the most commonly encountered.

5. The highly located "appical" diverticula of the stomach which are considered by some authors as "asymptomatic" as diverticula with other location, may display the picture of various gastrointestinal, billiary and other abdominal disorders, causing grave diagnostic pitfalls.

6. A more continuous retaining of the contrast medium in the diverticulum is an indirect symptom of diverticulitis; therefore the X-ray examination and follow-up of the duration of contrast medium retaining in the diverticulum is of utmost importance.

## REFERENCES

1. Атанасова, Д. и Ал. Карич. Върху дивертикулите на стомаха по повод на наблюдаван случай. — *Съвр. мед.*, 4, 1958. 2. Егорова, Е. К. и Смольянинова. Дивертикул кардиального отдела желудка. — *Хирургия*, 5, 1958. 3. Каган, Е. М. Дивертикулы желудка. — *Клин. мед.*, 4, 1956. 4. Марголис Е. С. К вопросу о функциональных дивертикулах желудка. — *Вестник рентгенологии и радиологии*, т. 24, в. 2—3, 1940. 5. Мельников, А. В. Клиника предопухолевых заболеваний желудка. Медгиз, 1954. 6. Посадков, В. М. О дивертикулах желудка. — *В-к хир. им. Грекова*, 71, 1, 58, 1952. 7. Савицкий, А. И. О кардиальных дивертикулах желудка. — *Хирургия*, 11, 1940. 8. Савицкий, Ю. Н. и Г. Н. Грейстер. Прекардиальный дивертикул желудка. *Вестник рентгенологии и радиологии*, 5, 1958. 9. Фанарджян, В. А. Рентгенодиагностика заболеваний пищеварительного тракта. т. I, 1961. 10. Bayer L. u. Pansdorf, H. — Der röntgenologische Nachweis von Divertikeln im Bereich des Verdaungskanals und seine klinische Bedeutung. Erg. med. *Strahlenforschung*. B. VI. 1933. 11. Bársony, Th. Das Divertikel als zweite Krankheit. Wien. — *Klin. Wschr.* 41, 1928. 12. Bársony, Th. u. E. Koppenstein. Spitzendivertikel des Magenfundus. — *Fortschr. Röstr.*, 46, 1932. 13. Beck, H. R. Über hochsitzende Magendivertikel. — *Fortschr. Röntgenstr.*, B. 74, hf, 1951. 14. Beutel u. Mohler, P. Zur Symptomatologie und Diagnose der kardianahen Magendivertikel. — *Fortschr. Röntgenstr.*, B. 41, 1930. 15. Bown, Bisonette, Abel. Diverticula of the Stomach. — *Gastroenterology*, 12, I, 1949. 16. Eells, R. W. a. Simril W. A. Gastric diverticula. *Amer. J. Roentgenol.*, 68, I, 1952. 17. Fleischner, F. Das kardianahe Magendivertikel. — *Klin. Wschr.*, 3, 1924. 18. Hauwerk, C. Zur Kenntnis der Magendivertikel. — *Dtsch. med. Wschr.*, 46, 1920. 19. Konjetzny,

G. E. Zur Frage der echten Magendivertikel. — *Fortschr. Röntgenstr.*, B. 31, 92, 1917. 20. Koppenstein, E. Über Divertikel des Magens. — *Fortschr. Röntgenstr.*, B. 38, 1928. 21. Laurell, H. Zur Frage der Entstehung kardianahen Magendivertikel. — *Acta radiol.*, 12, 1931. 22. Laurent, J. e. Brombart, M. Les diverticules gastriques — *Acta Gastro-Enteriologica Belgica*, vol. XVII. Fase. 3, 1954. 23. Ledoux-Lebard, R. Manuel de Radiodiagnostic clinique. Masson, 1949. 24. Leszler, A. Divertikel der Hinterwand der Kardia. Röntgenpraxis h$_2$, 1940. 25. Pansdorf, H. Ein reines congenitales Pylorusdivertikel, bei gleichzeitig bestehendem ulcus duodeni. Röntgenpraxis h$_1$, 1829. 26. Prevot, R. Röntgendiagnostik des Magendarmkanals. G. Tieme, Stutgart, 1959. 27. Rivers, A. B. G. A. Stevens, a. B. R. Kirklin. Diverticula of stomach. *Surg. Gynec. obstetr.*, 60, 106, 1935. 28. Schmidt, A. Das Divertikel des Magens und Zwölffingerdarm. Bruns, Beitr., 183, 2, 1951. 29. Schmidt, H. W. a. W. Walters. Diverticula of Stomach. — *Am. j. Surg.*, 52, 315, 1941. 30. Schinz, Baensch, Friedl u. Uehlinger. Lehrbuch der Röntgendiagnostik., 5 Aufl. 1952, Bd. IV, 31. Toubiana, M. Diverticule de l'esmac Simulant, radiologiquement une niche ulcereuse de la petite curbure. — *Const. Med.*, 3, 1952. 32. Teschendorf, W. Lehrbuch der röntgenologischen Differentialdiagnostik der Bauchorgane. G. Thieme (Stutgard), 1950. 33. Wieser, C. Kardianahes Magendivertikel als wiederholte Blutungsquelle bei 65 jährigen Bluter. — *Fortschr. Röntgenstr.*, B. 84, h$_4$, 1956. 34. Weiss, K. Zur Symptomatologie der Magenspitzendivertikel. — *Fortschr. Röntgenstr.* B. 77, h$_4$. 1952.

## К РЕНТГЕНОЛОГИЧЕСКОМУ ДИАГНОЗУ ДИВЕРТИКУЛИТОВ ЖЕЛУДКА

*Д. Попмихайлов*

### РЕЗЮМЕ

Автор рассматриваст рентгеновскую симптоматологию дивертикулов желудка, указывая на их характерные признаки: наличие рельефа слизистой, который прослеживается как в шейке, так и в самом дивертикуле; изменения в их форме и величине при исследовании, при переходе из положения стоя в положение лежа, или на серийных рентгенограммах, сделанных через интервалы в несколько минут; отсутствие „воспалительного вала" в области их прикрепления к желудку и др.

В диагностически трудных случаях автор применяет полиграфическое исследование, описывая т. наз. им „симптом раздвоения тени дивертикула" — на биплограмме, и подчеркивает диагностическое значение полиграфии.

Указывается на обстоятельство, что иногда очертания дивертикула можно увидеть на рентгенограмме и без бариевой взвеси, в результате утолщения его стенок. В этих случаях, границы дивертикула видны как кольцевидная тень. Этот признак автор называет „симптом кольца" он принимает его как косвенный признак дивертикулеза.

Что касается т. наз. „верхушечных дивертикулов", которые некоторые считают бессимптомно протекающими, автор подчеркивает на основании изучения 14 больных с указанной локализацией дивертикула желудка, что и эти дивертикулы, подобно дивертикулам с иной локализацией, могут выявиться картиной разных желудочно-кишечных, желчных и других заболеваний в полости живота и создать клиницисту большие диагностические трудности.